SOUND ATTENUATING FRAMING SYSTEM

Background of the Invention

The present invention relates to a framing system and components therefor and more especially but not exclusively to a timber wall system having sound attenuating properties.

To the present time various proposals have been put forward to achieve sound attenuation in building constructions. Building regulations or codes in many countries, including New Zealand, specify the sound attenuation properties required in buildings. These are now being vigorously enforced in many countries, particularly with the popularity of apartment blocks where a high level of sound attenuation is required between adjacent apartments. Typically in New Zealand a Sound Transmission Class (STC) of 55 may be specified for inter-tenancy walls.

Various proposals have been put forward in respect of building materials and/or building components to achieve required levels of STC.

In Australian Patent specification 199917377 (Lympike) there is disclosed an acoustic mount which isolates parts of a building from acoustic vibrations. The mount consists of a clip with a sound absorbing rubber insert, the clip being adapted to provide the connection, and the acoustic isolation, between two parts of a building construction. Those parts could be a plaster board wall spaced apart from a block wall. Such acoustic mounts, relying on a resilient insert, tend to require a fairly complex and expensive multi-part construction.

In WO 03/071044 (Lafarge) a resilient brace is proposed for improving sound proofing between portions of a wall in which the resilience is provided by the provision of holes in a spring steel plate and wire fold lines extending through pairs of the holes. The central portion of the brace therefor consists of multiple planar sections which can open and close relative to each other in response to acoustic vibration. The requirement to aperture and multi-fold the central portion of this brace would contribute both to the complexity and cost of its manufacture.

Objects of the Invention

The present invention seeks to provide a framing system and components therefor which will enable appropriate sound attenuation in buildings in an effective manner and/or will at least provide the public with a useful choice.

Further objects of this invention will become apparent from the following description.

Summary of the Invention

According to one aspect of the present invention there is provided a plate for use in a sound attenuating building construction, said plate having first and second spaced apart flanges, each flange being adapted for securement in use to a respective element of said building construction, a resilient connection means extending between adjacent edges of said flanges, said resilient connection means consisting of a folded portion of the plate defining a single substantially "U" or "V" shape.

According to a further aspect of the present invention there is provided a building frame including at least a pair of spaced apart frame elements required to be connected together, at least one plate having first and second spaced apart flanges, each flange being secured to a respective said element, a resilient connection means extending between said flanges to space apart said elements, said resilient connection means consisting of a folded portion of the plate defining a single substantially "U" or "V" shape, the arrangement being such that sound acting directly or indirectly on said elements will result in movement of said resilient connection means to provide sound attenuation characteristics for a building construction in which said frame is incorporated.

Preferably each of said flanges is provided with a plurality of upstanding nails.

Alternatively each of said flanges is provided with a plurality of nail holes.

Alternatively one or both of the flanges may be folded to provide an end portion adapted for securement in use to a respective element of said building construction.

Optionally the plate may be in the form of a strip of indeterminate length.

Preferably each of said flanges adjacent said connection means is provided with respective upstanding location means for positioning the plate relative to the elements.

According to a further aspect of the present invention there is provided a plate and/or a building frame substantially as herein described with reference to any one of the embodiments of the accompanying drawings.

Further aspects of this invention which should be considered in all its novel aspects will become apparent from the following description given by way of example of possible embodiments thereof and in which reference is made to the accompanying drawings.

Brief Description of the Drawings

Figure 1: Shows very diagrammatically part of a building frame according to one possible embodiment of the invention;

Figure 2: Shows a plan perspective view of a plate according to one possible embodiment of the invention;

Figure 3: Shows an end perspective view of a plate according to a further embodiment of the invention;

Figure 4: Shows very diagrammatically part of a prefabricated building frame according to one possible embodiment of the invention;

Figure 5: Shows diagrammatically an enlarged corner portion of the frame of Figure 4;

Figure 6: Shows diagrammatically a plate according to a further possible embodiment of the invention; and

Figure 7: Shows diagrammatically a plate according to a still further embodiment of the invention.

Brief Description of Possible Embodiments of the Invention

As previously mentioned, the present invention seeks to provide sound attenuation in a building construction such as a wall system.

In Figure 1 a pair of timber studs 1 are shown as part of a wall system by way of example only.

Connected to and spacing apart the studs 1 is shown, by way of example only, a pair of plates 2 according to one possible embodiment of the invention, these being positioned on alternate sides of the studs 1.

Each plate 2 is shown in one embodiment in greater detail in Figure 2. The plates 2 are shown provided with a pair of flanges 3 connected between adjacent edges 4 by a resilient connection means 5. The flanges 3 may be provided with a plurality of pre-punched nail spikes 6 as shown particularly in Figure 2. Alternatively the flanges 3 could be provided with nail holes 7 such as shown diagrammatically in Figure 1.

The flanges 3 may also preferably include respective location means 8 which may include upstanding projections such as shown particularly in Figure 2 which in use will facilitate the positioning of the plate 2 relative to the adjacent surfaces of the studs 1 provided with nail holes 7 such as shown diagrammatically in Figure 1.

The resilient connection means 5 is shown having a single substantially "U" or "V" shape in this example and this is formed by spaced apart surfaces 9 which can move relative one with the other in a spring action about their connecting edge 10.

The present invention will therefore utilise the mass-spring-mass principles of sound attenuation as the plates 2 in a building frame will react to sound impacting on the construction elements connected with the studs or the like 1.

In experimentation it has been found that a construction using the present invention may achieve improved STC ratings of the order of 7dB over single timber frame systems.

Typically the plates 2 may be fitted at approximately 600mm centres on alternate sides of studs or the like 1 and top and bottom plates.

In Figure 3 an enlarged end view of a modified plate 2 is shown, with corresponding numerals being used. The plate 2 is shown in the form of a nail plate with triangular

spikes 6 typically punched out from the flanges 3. A single enlarged location means 8, however, replaces the pair of location means 8 on each flange 3.

Referring now to Figures 4 and 5 particularly, the same reference numerals as used in Figures 1 to 3 are used where appropriate.

A plurality of plates 2 of the present invention are shown connecting respective pairs of studs 1, respective pairs of top plates 11 and respective pairs of bottom plates 12 and on alternate sides of the studs, top plates and bottom plates along the length of each pair.

In this manner a prefabricated frame such as a wall can be constructed off site and then taken to where it is needed as and when required.

Although individual plates 2 are shown in Figures 4 and 5 for example, it is envisaged that the plates 2 could be in the form of a strip of indeterminate length which can then be cut off as required either on site, or off site in a prefabrication process, so as to provide a bracing effect along a required length of studs or plates.

It is envisaged that the plates 2 may be fitted by machine as is known in the manufacture of roof trusses for example. Alternatively it is envisaged that the plates 2 may be secured by hand.

Typically it is envisaged that the studs 1 may in one use be part of a wall system incorporating wall boards such as gypsum wall boards.

Referring now to Figure 6, the same reference numerals being used where appropriate, a plate 20 has its resilient section 10 in the form of a "V" with surfaces 9 able to respond to sound impact on the building elements. A flange 2 has nail spikes 6 and spacers 8 to engage with a stud or the like (not shown).

The other initial short width flange 22 is, however, folded at substantially 90^0 into a longer end section flange 21 which is adapted to be secured to a wall, such as a masonry or concrete wall or the like, by any suitable means.

In Figure 7, again the same reference numerals being used where appropriate, a plate 30 is forming a stud and has a resilient section 31 in the form of a "U" with substantially

opposite faces 32, 33 connected by a connecting portion 34. Flanges 36 and 35 extend on either side of the resilient section 31. Flange 36 is folded into an end section flange 37 adapted to be secured to a wall, such as a masonry or concrete wall or the like, by any suitable means.

It is envisaged that the wall securement means of Figures 6 and 7 may include nails or the like, or possibly the embedding of the flanges in the wall material.

The other flange 35 is shown folded over to provide an end flange 38 and an in turned edge 39. The flange 38 is shown provided with an inward facing groove 40 which may provide a marker for the central axis of flange 38 to assist in the positioning of wall material.

The applicant believes that the present invention is unique in that it will be able to make use of a smaller profile of timber to replicate a double stud system while still maintaining structural integrity. In doing so it is envisaged that it will take up less floor space and may be able to be pre-assembled and form part or the entirety of a pre-cut or pre-nailed frame.

It is envisaged that in a typical timber construction the studs 1 may generally be of the order of 50mm x 50mm although larger sizes may be used where structural loadings require this.

It is emphasised however that the flanges 3 may be adapted as required for the plates 2 to be used in other than timber constructions, e.g. in steel framed constructions.

Where in the foregoing description, reference has been made to specific components or integers of the invention having known equivalents then such equivalents are herein incorporated as if individually set forth.

Although this invention has been described by way of example and with reference to possible embodiments thereof, it is to be understood that modifications or improvements may be made thereto without departing from the scope of the invention as defined in the appended claims.